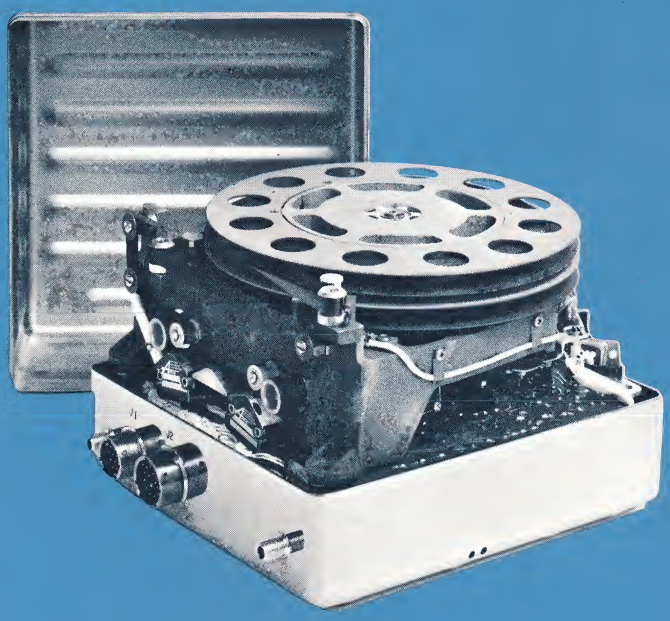
LEACH CORPORATION
CONTROLS DIVISION



LEACH SATELLITE TAPE RECORDERS — SERIES 2000

leach satellite recorders

Leach Controls Division, first in the design and manufacture of Satellite Tape Recorders, has logged an impressive record of accomplishments in support of major United States Space Programs. Today, over 85% of all Satellite Recorders are Leach built. Twenty different types in over 30,000 hours of operation have successfully accomplished more than 100 missions.

CUSTOM DESIGNED TO PROVIDE EFFICIENT PERFORMANCE

The original tape transport for satellite applications was designed by Leach to collect data during one or more orbits of the earth, and upon interrogation, to release the data in a burst through a high speed playback system. Small size, low weight and minimum power consumption are requirements of the application.

Basic Mechanical Specifications

Tape Capacity (0.65 mil) ..... 3000 ft.
(1.08 mil) ..... 1900 ft.
(1.5 mil) ..... 1200 ft.
Tape Width ..... ¼ inch
Number of Tracks ..... Two (2) standard; up to 7 on special order
Tape Speeds Available ..... 0.1 to 100 ips
Speed Regulation ..... ±0.5%
Reproduce/Record Ratios ..... Up to 200/1
Direction of Operation ..... Bi-directional (reproduce in either direction)
Modes ..... Record, Reproduce, Rewind
Controls ..... Remotely controlled
Size (2 Channel) ..... 7.6″x 7.1″x 5.312″ (290 in^3)
Weight ..... 10 to 15 pounds
Power ..... 22 to 30 volts DC, 5 to 25 watts depending on tape speed

CUSTOM DESIGNED TO INSURE FAILURE-FREE LONG LIFE

Rugged construction of the Series 2000 recorders insures non-operating survival during the most severe launch environments. Precision assembly and hermetic sealing provides operating life of more than one year in orbit. All components are space qualified and approved. The Model 2200 recorder has been fully tested for reliable operation after radiation exposure of up to 1 x 10^{13} neutrons per cm^2 and 1 x 10^8 carbon rads.

Environmental Specifications

Operating
Temperature ..... 0° to 130° F
Altitude ..... Unlimited
Acceleration ..... 0g (orbital) to 1g
Survival – Rocket Launch (Agena, Delta, Scout)
Temperature ..... −30° F to +165° F
Acceleration 11.6g
Shock ..... 40g, 6 msec.
Vibration, sine ..... 3g from 14 to 40 cps
7.5g from 40 to 400 cps
15g from 400 to 3000 cps
Vibration, Random .. 0.07g^2/cps from 20 to 400 cps
0.13g^2/cps from 400 to 2000 cps
Acoustic ..... 145 db, 37.5 to 9600 cps
MTBF ..... greater than 14,000 hours

CUSTOM DESIGNED FOR FLEXIBILITY IN DATA PROGRAMMING

Most important in the design of the Series 2000 was provision for modification in data requirements. Multiple head stacks and signal conditioning electronics, interfaced with the record and reproduce heads, accommodate PAM/FM, Direct, Single carrier FM, Multiplex FM, PDM and digital data in various combinations and over a wide rate range.

To date, using the original tape transport as a nucleus, over 20 different types have successfully accomplished their missions. Many other electronic options can be supplied on special order.

Analog Systems

Input Frequency ..... 200 cps – 150 kcps
Input Level ..... 1 V rms
Impedance ..... 200 K ohms minimum shunted by 100 pf
Output Frequency ..... 400 cps – 150 kcps ± 3 db
Level ..... 1 V rms
Impedance ..... 1000 ohms maximum
Signal/Noise ..... 30 db rms to rms
Distortion ..... 3% from 0° to 85° F
5% from 85° to 130° F

FM Systems

Input Frequency ..... DC to 975 cps sine
DC to 120 cps square
Level ..... 0 to 5.3 volts peak
Impedance ..... 200 K ohms minimum
Output Frequency ..... DC to 3900 cps sine
DC to 480 cps square
Level ..... 0 to 5.3 volts peak
Impedance ..... 1000 ohms maximum
Signal/Noise ..... 30 db p/p
Linearity ..... ±0.1 volts
Rise Time (squarewave) ..... 100 microseconds
Overshoot ..... 5% maximum

Digital Systems

Recording Technique ..... Manchester Code
Input Data Rate ..... Up to 100K bit/sec./track at 50 ips
Impedance ..... 20K ohms minimum
Level ..... "1" = 6 ± 0.5 V
"0" = 0 ± 0.5 V

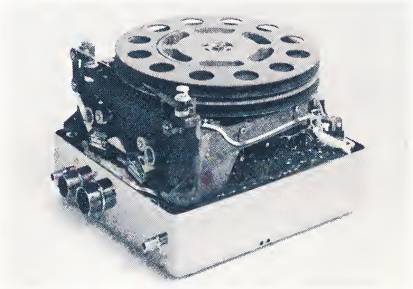
NOTE: Specifications subject to change without notice.

Digital Systems (con't)

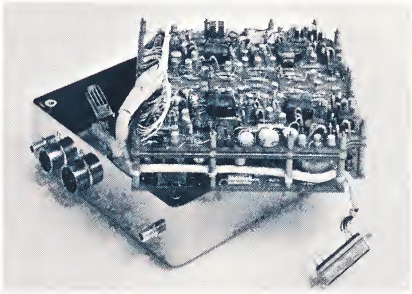
Output Data Rate .....200K bit/sec./per track at 100 ips
Level .....“1” = 6 ± 0.5 V
“0” = 0 ± 0.5 V
Impedance .....600 ohms
Packing Density .....2000 bits/inch/track
Error Rate .....Less than 1 in 10^6
Bit Jitter .....±1% of bit period

Megacycle Systems

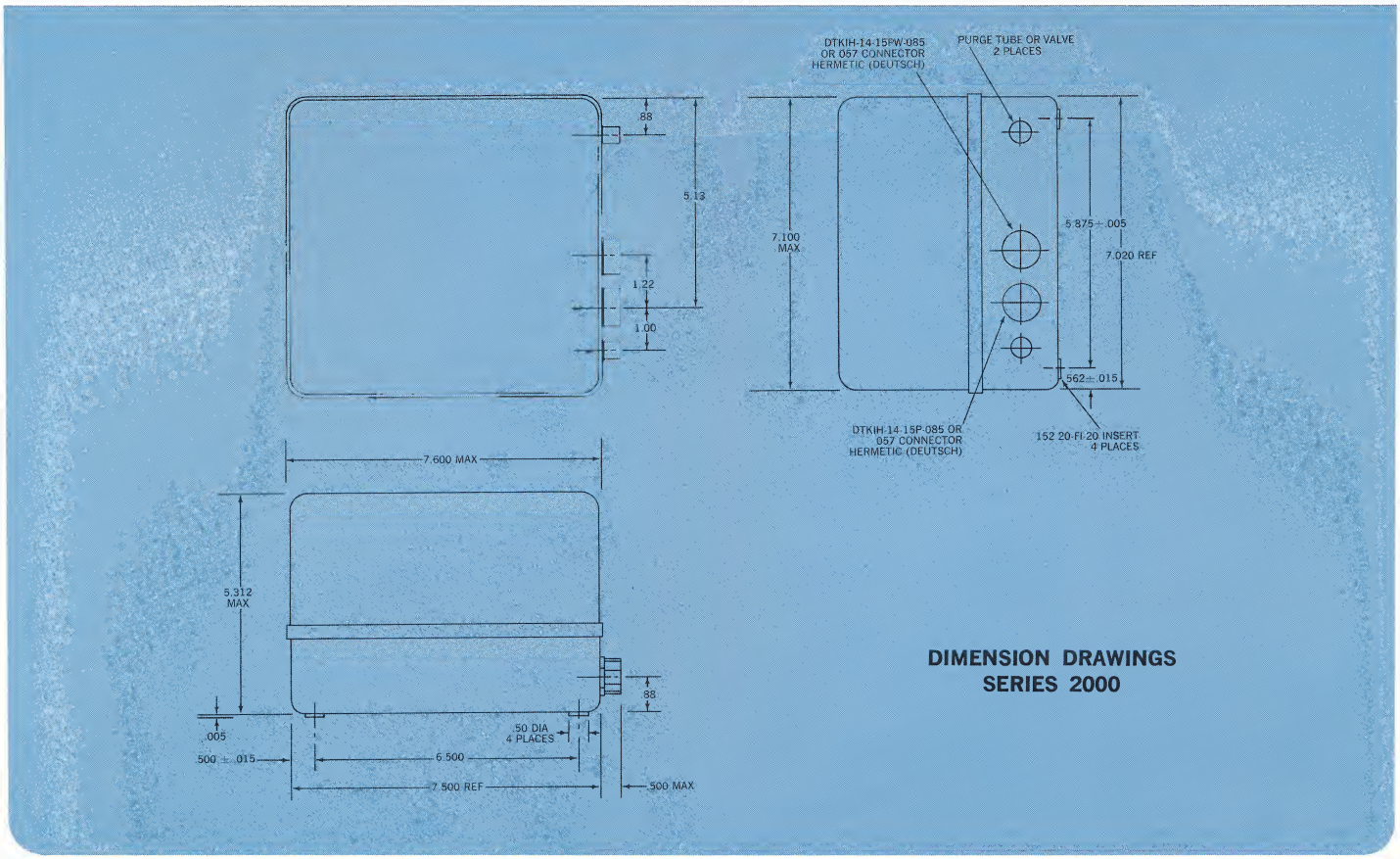
Input Frequency .....250 kc, 500 kc, 1 megacycle
Level .....3 volts p/p
Impedance .....2000 ohms
Output Frequency .....1 kc to 1 megacycle ±3 db
Level .....3 volts p/p
Impedance .....50 ohms
Signal/Noise....Better than 26 db rms broadband
Distortion .....3% maximum @ 10 kc
Envelope Delay (Phase distortion) .....less than 0.2 microsecond from 100 kc to 1 mc
Crosstalk .....—30 db maximum



Open view of recorder showing compact, rugged packaging



Record/reproduce electronics packaged on card file



DIMENSION DRAWINGS SERIES 2000

Capabilities

From this modern facility have come data storage equipment for complex programs such as: Project Apollo, Discoverer/Agena Satellites, LEM (Lunar Excursion Module), Project Saturn, the Polaris Program, and many classified military projects.

The range and variety of the projects has been extraordinary. Each development contract was a challenge and an inquiry into entirely new areas. Both resulted in the improvement of subsequent systems. The improvements, in turn, have boosted the growth and expanded the capabilities of the Controls Division.

One group, the Development Staff, was independently organized to investigate and implement new techniques in all phases of high-reliability tape recordings. Not only are circuit and logic designs refined for new specifications, but hardware and related production processes are developed for each application.

If you have an application with special specifications or extreme environmental problems, tell us. We'll examine it in detail, and propose the precise equipment for the exact solution.

At Leach Controls Division, leadership in new technology assures continued growth and quality products.

Facilities

The Controls Division of Leach Corporation is one of the nation's foremost developers and manufacturers of high environmental aerospace and industrial data acquisition and recording equipment. In a facility of 70,000 square feet, advanced systems are designed and built for space, geophysical, and oceanographic applications.

Here also, more than 450 Leach people contribute to the advancement of scientific research, safety standards and the exploration of man's physical environment, simulated in fully equipped test laboratories.

Precision assembly area

"White room" for the ultimate in contaminant-free assembly.

LEACH

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